Validation of a Energy Management Strategy for a BIPV System with a Vanadium Battery Demonstrator

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BIPV System Demonstrator

Vanadium redox flow Battery:

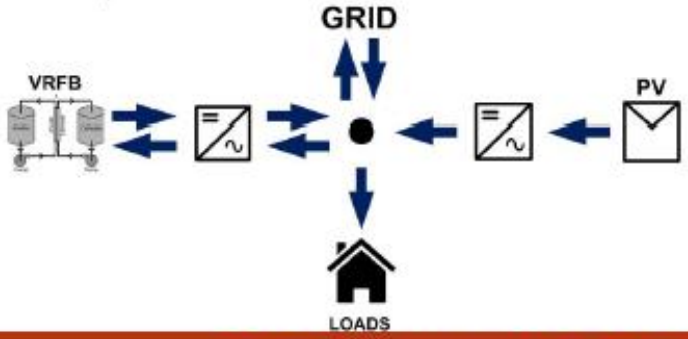
- 5 kW nominal power
- 60 kWh capacity

Battery Inverters: 3x2.4 kW nominal power

PV installation: 6.74 kWp (m-Si and p-Si)

PV inverter: 12.5 kW nominal power (2 MPPT)

Three phase installation



Self Consumption Optimization Strategy

General Objective:
Study of grid interface in rooftop PV systems with energy storage.
The specific objective for this energy strategy is to maximize the consumption of locally produced PV power, hence minimizing the injection of power into the electrical grid.

Implementation:

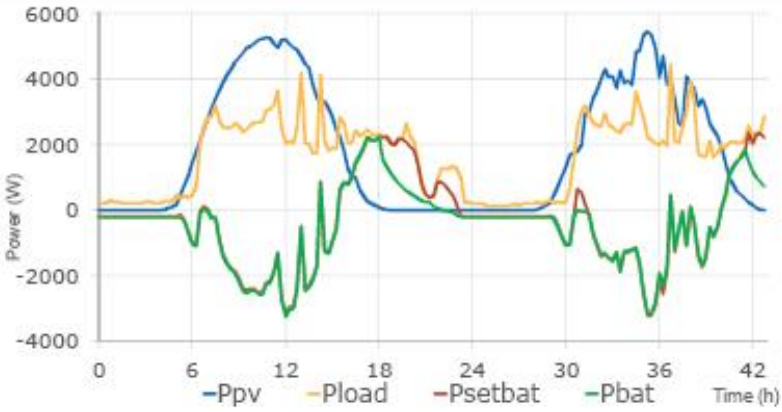
$P_{setBat} = P_{pv} - P_{load}$

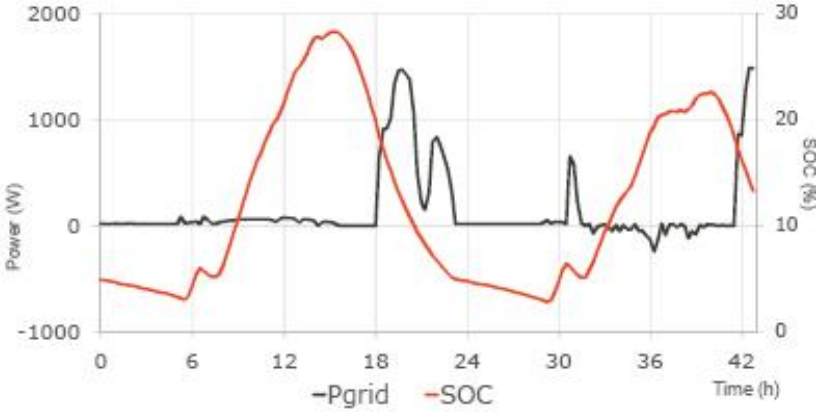
$P_{grid} = P_{setBat} - P_{bat}$

Due to technical operational limits (voltage and SOC), a control to avoid overdischarge/charge was implemented.

Conclusions:
The strategy achieved a minimized peak power (1.4kW) exchange with the grid, even at lower SOC levels (SOC<30%).

P_{setBat}	AC Power command to battery inverter
P_{pv}	PV AC power
P_{load}	Loads AC power consumption
P_{grid}	AC Power exchange with the grid
P_{bat}	Measured battery inverter AC power
SOC	Battery state of charge





For more information see also poster "Performance Characterization of a Vanadium Redox Flow Battery".

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